

Claims

- [c1] A castable weldable nickelalloy consisting essentially of, by weight, 18% to 20% cobalt, 22.2% to 22.8% chromium, 1.8% to 2.2% tungsten, greater than 1.5% to 2.3% aluminum, 1.6% to 2.4% titanium, the sum of aluminum and titanium being 2.8% to 4.4%, 0.7% to 0.9% columbium, 0.9% to 1.9% tantalum, 0.003% to 0.009% boron, 0.002% to 0.02% zirconium, 0.05% to 0.10% carbon, with the balance essentially nickel and incidental impurities.
- [c2] The alloy according to claim 1, wherein the tantalum content is above 1.5%.
- [c3] The alloy according to claim 1, wherein the alloy has been solution heat treated at about 1150 ° C for about four hours, quenched to below about 700 ° C, and then aged at about 800 ° C for about eight hours.
- [c4] The alloy according to claim 1, wherein the alloy contains about 26 to about 38 volume percent of a gammaprecipitate phase.
- [c5] The alloy according to claim 1, wherein the alloy is in the form of a cast nozzle of a gas turbine engine.
- [c6] The alloy according to claim 1, wherein the nozzle is installed in a second turbine stage of the gas turbine engine.
- [c7] The alloy according to claim 1, wherein the alloy contains, by weight, about 19% cobalt, about 22.5% chromium, about 2% tungsten, about 1.75% aluminum, about 2% titanium, the sum of aluminum and titanium being about 3.75%, about 0.8% columbium, about 1.5% tantalum, about 0.005% boron, about 0.005% zirconium, about 0.07% carbon, with the balance essentially nickel and incidental impurities.
- [c8] The alloy according to claim 7, wherein the alloy is in the form of a cast nozzle of a gas turbine engine.
- [c9] The alloy according to claim 7, wherein the nozzle is installed in a second turbine stage of the gas turbine engine.
- [c10] A nozzle installed in a second turbine stage of the gas turbine engine and cast

from a nickelalloy consisting of, by weight, 18% to 20% cobalt, 22.2% to 22.8% chromium, 1.8% to 2.2% tungsten, greater than 1.5% to 2.3% aluminum, 1.6% to 2.4% titanium, the sum of aluminum and titanium being 2.8% to 4.4%, 0.7% to 0.9% columbium, 0.9% to 1.9% tantalum, 0.003% to 0.009% boron, 0.002% to 0.02% zirconium, 0.05% to 0.10% carbon, with the balance essentially nickel and incidental impurities.

- [c11] A castable weldable nickelalloy consisting essentially of, by weight, 5% to 8% cobalt, 22.2% to 22.8% chromium, 1.8% to 2.2% tungsten, 1.2% to 2.3% aluminum, 1.6% to 2.4% titanium, the sum of aluminum and titanium being 2.8% to 4.4%, 0.7% to 0.9% columbium, 0.9% to 1.9% tantalum, 0.003% to 0.009% boron, 0.002% to 0.02% zirconium, 0.05% to 0.10% carbon, with the balance essentially nickel and incidental impurities.
- [c12] The alloy according to claim 11, wherein the tantalum content is about 1.5% and the aluminum content is about 1.85%.
- [c13] The alloy according to claim 11, wherein the alloy has been solution heat treated at about 1150 ° C for about four hours, quenched to below about 700 ° C, and then aged at about 800 ° C for about eight hours.
- [c14] The alloy according to claim 11, wherein the alloy contains about 23 to about 36 volume percent of a gamma precipitate phase.
- [c15] The alloy according to claim 11, wherein the alloy is in the form of a cast nozzle of a gas turbine engine.
- [c16] The alloy according to claim 11, wherein the nozzle is installed in a third turbine stage of the gas turbine engine.
- [c17] The alloy according to claim 11, wherein the alloy contains, by weight, about 6.5% cobalt, about 22.5% chromium, about 2% tungsten, about 1.85% aluminum, about 2% titanium, the sum of aluminum and titanium being about 3.75%, about 0.8% columbium, about 1.5% tantalum, about 0.005% boron, about 0.005% zirconium, about 0.07% carbon, with the balance essentially nickel and incidental impurities.

- [c18] The alloy according to claim 17, wherein the alloy is in the form of a cast nozzle of a gas turbine engine.
- [c19] The alloy according to claim 17, wherein the nozzle is installed in a third turbine stage of the gas turbine engine.
- [c20] A nozzle installed in a second turbine stage of the gas turbine engine and cast from a nickelalloy consisting of, by weight, 5% to 8% cobalt, 22.2% to 22.8% chromium, 1.8% to 2.2% tungsten, 1.2% to 2.3% aluminum, 1.6% to 2.4% titanium, the sum of aluminum and titanium being 2.8% to 4.4%, 0.7% to 0.9% columbium, 0.9% to 1.9% tantalum, 0.003% to 0.009% boron, 0.002% to 0.02% zirconium, 0.05% to 0.10% carbon, with the balance essentially nickel and incidental impurities.